Ozone Exposure and Death: Two Studies in the United States and Europe

March 17, 2005

Air Resources Board

California Environmental Protection Agency

U.S. Study

- 95 cities in large urban areas, 1987-2000
- Model adjusted for weather, season, day-of-week, long-term trends
- 10-ppb increase in 1-hour maximum ozone associated with 0.10% increase in non-injury related deaths
  - 95% confidence interval: 0.05% to 0.16%
  - larger increase in death from heart and lung disease
  - larger increase for previous week's ozone
  - similar effect among age groups or when PM is included

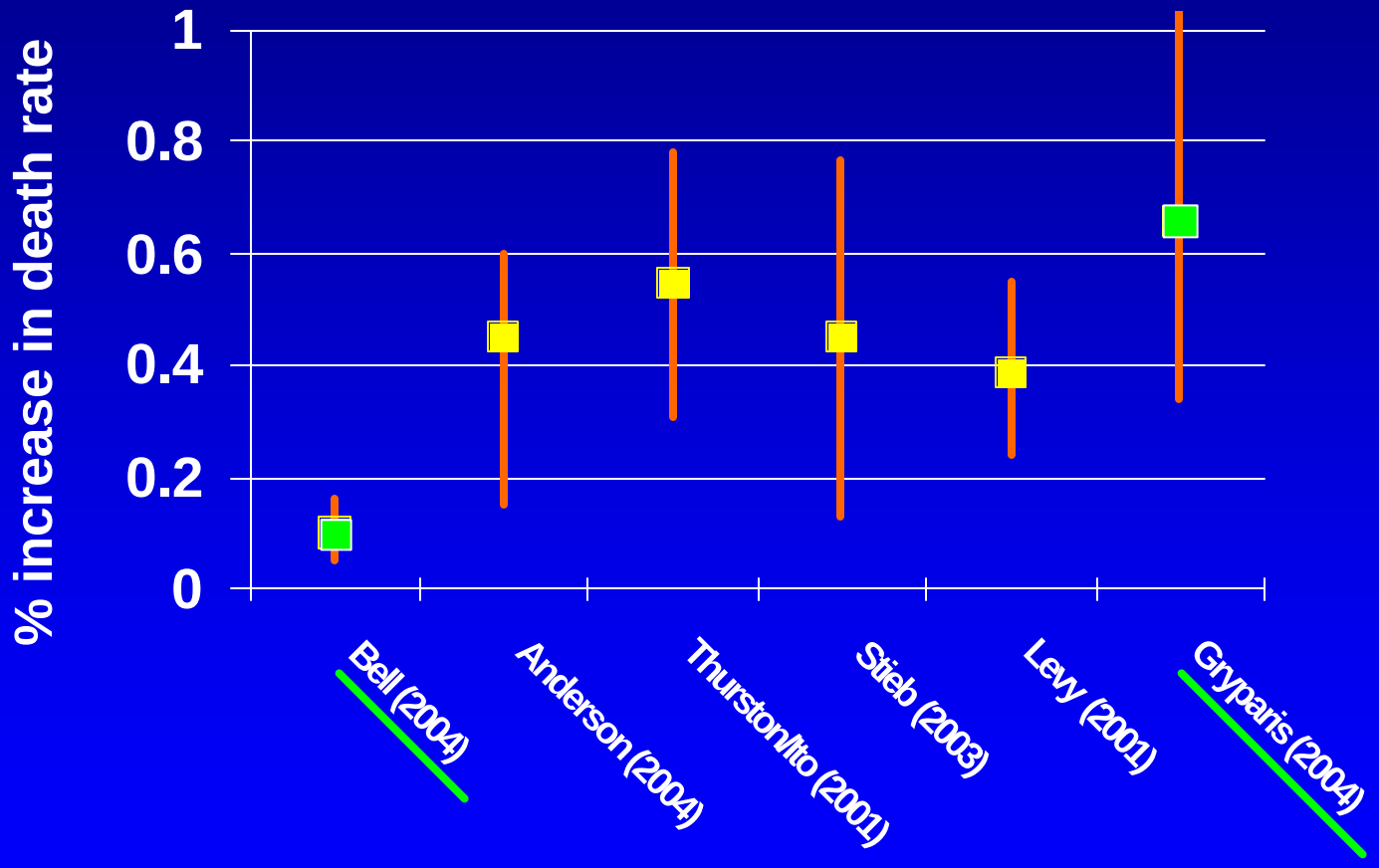
Bell et al. (2004) Journal of the American Medical Association, Volume 292, pages 2372-2378

European Study

- 23 cities in 15 countries, 1990-1997
- Model adjusted for weather, season, day-of-week, local events
- 10-ppb increase in 1-hour maximum ozone in summer associated with 0.66% increase in non-injury related deaths
  - 95% confidence interval: 0.34% to 1.04%
  - larger increase in death from heart and lung disease
  - effect independent of SO_2 and PM10, but somewhat confounded by NO_2 and CO

Gryparis et al. (2004) American Journal of Respiratory Critical Care Medicine, Volume 170, pages 1080-1087

Comparison of U.S. and European Studies to Other Studies



Health Benefits of Reducing Ozone in California

- Estimate 580 deaths (probable range: 290 to 870) would be avoided annually if the 1-hour standard of 90 ppb is attained
  - low value reflects U.S. study, high value reflects European study, central value reflects other meta-analyses
  - consistent ozone reductions (above 40 ppb) found for SoCAB (1980 to present); basin-specific rates used
  - assumed ozone-related death rate applies to statewide range of ozone levels
  - methodology peer-reviewed by experts in the field
- U.S. EPA obtained similar results for California

Ozone Effects on Health: Summary

- Ozone effects on death supported by scientific literature
- Substantial evidence of health benefits from reduced ozone pollution

Next Steps

- Ozone standard staff report released March 11, 2005
- Recommendations for new state ambient air quality standards for ozone to be considered by the Board in April 2005